Prioritisation *of* Threatened Flora *and* Fauna Recovery Actions

for the Tasmanian NRM Regions

Threatened Species Section

Department of Primary Industries, Parks, Water & Environment

Nature Conservation Report 10/03

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Executive **Summary**

The Threatened Species Section (TSS) of the Department of Primary Industries, Parks, Water and Environment (DPIPWE) was contracted by Tasmania's three NRM groups to prioritise threatened species recovery actions.

Prioritisation of projects to secure threatened species was undertaken on the basis of their cost-efficiency in meeting the following objective and target:

Objective: Within 50 years, to secure in the wild in Tasmania the greatest number of threatened taxa as possible.

Target: A taxon is defined as secure when its numbers and distribution are stable or increasing, and are sufficient that there is a 95% probability that it will survive the stochastic events anticipated over a 50 year timeframe, given that all known and predicted threats are adequately mitigated.

The Project Prioritisation Protocol (PPP), developed by the University of Queensland (UQ) and the New Zealand Government's Department of Conservation (DOC), provided a consistent and transparent approach in prioritising recovery projects to minimise threatened species extinctions. This approach prioritises projects on the basis of their cost-efficiency in meeting an objective, to ensure that the maximum is achieved with a limited budget. One project was designed to secure each species. Projects were ranked in the order that they should be initiated, on the basis of their Benefit to the species, the likelihood of their Success and their Cost, as assessed by relevant experts using the best available information. Two interviewers maintained consistency using a standardised set of questions. In view of time constraints, only species listed as Critically Endangered, Endangered or Vulnerable under either the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) or the Tasmanian *Threatened Species Protection Act 1995* (TSP Act) were assessed. The developers provided substantial guidance and support to the Threatened Species Section.

Projects were prioritised on the basis of their contribution to a single objective: the minimisation of number of extinctions within the short term (50 years). This objective reflects the requirement of the *Threatened Species Protection Act 1995* for a strategy to ensure the survival of threatened species. Threatened species conservation helps address numerous different objectives, but it is ineffective and confusing to prioritise projects on the basis of some combination of these; the relative importance of each objective to funding agencies can change annually. However, weightings can later be applied to the prioritised list if required. For example, if funders wish to favour Tasmanian endemics, they can either fund only projects on these species, or apply a weighting based on degree of endemicity to the list.

Each project represents the minimum required to secure each species over a 50 year time frame, but may not necessarily be sufficient to secure all its populations, nor its genetic diversity. For the present purpose, the short-term securing of extra species was viewed as a higher priority than the securing of extra populations of a species already secure over the short term. A review of the implications of the selected objective is appropriate for future work.

A prioritised list (List 1) indicates an order for funding recovery projects for the 171 species on which there was sufficient information and which experts considered could be secured purely through Tasmania-based projects over a 50 year period. This order may change when cost-sharing is incorporated by a coordinating agency. Cost-sharing can only be calculated when it is known which projects can be funded, since projects must be funded entirely to minimise extinctions cost-efficiently.

To secure all 171 threatened species on the priority list over a 50 year period was estimated to cost approximately $155 million (not withstanding some excluded and shared costs). Where sufficient funds are not available to carry out all projects simultaneously, extinction risk can only be minimised and not eliminated. However, many species are surprisingly inexpensive to secure: the top 28 species can be secured over a 50 year period for less than $1 million, with only $180,000 required in the first five years. To secure the top-ranking 165 species (96%) on List 1 costs less than half that required to secure the remaining 6 lowest-ranking species. To minimise extinction risk, it is most cost-efficient to secure species in their priority order because of the generally lower cost, higher likelihood of success and higher benefit of their projects. Some lower-ranking species may, however, rank highly on the basis of a different objective, such as iconic species protection or ecosystem function protection, and thereby receive funding sooner from a separate source.

The majority of projects (127 of 171) are confined to a single NRM region (Cradle Coast 26; North 43; South 58). Forty-four, however, are shared between two or more regions.

Key outcomes of the project were:

- A decision-making tool allowing funders to understand the tradeoffs of their resource allocation between this and other objectives.
- Lists of: prioritised threatened species projects; data deficient species; species already secure; species excluded for specified reasons
- Project prescriptions addressing a consistent objective for each of 171 species, with detailed costs, timing and locations.

The outcomes represent significant steps in addressing Recommendations 3, 4 and 14 of the 2009 *Auditor-General's Special Report on the Management of threatened species*. The exercise provided key information for listing statements, recovery plans and monitoring plans, and identified species requiring a status review.

The list, when used correctly, represents an invaluable decision-making tool for planning threatened species conservation programs, but there are a number of ways in which it can potentially be misused:

- Selection of single actions within high-ranking projects as high priority for funding.
- Grouping of common actions as priorities for multi-species recovery actions.
- Treatment of projects ranking low or absent from List 1 as low priority for all conservation objectives.
- Assumption that a fully funded project will fully recover a species.
- Assumption that the ranking presented in the report is exactly correct.

Recommendations for future work include a review of the prioritisation within the next 5 years, in light of progress and new information, incorporating all Tasmanian species. Additionally, the objective needs to be more formally agreed in light of the implementation of the 2009 priority list. A longer term objective may be more appropriate. If the approach is taken up nationally, species which cannot be secured purely through Tasmania-based actions can be included. Biodiversity conservation could be most cost-efficient if prioritisation is carried out across all objectives, and costs shared between funded projects across as well as within these objectives.

Acknowledgements

The input of the following experts in providing the substantial information required for the prioritisation process is gratefully acknowledged:

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The invaluable collaboration of Richard Maloney and Jodie Davis of the New Zealand Government's Department of Conservation, and of Liana Joseph of the University of Queensland, together with their colleagues is also gratefully acknowledged, in providing the Threatened Species Section with their Project Prioritisation Protocol methods, and in training and supporting our use and development of these for Tasmania's threatened species.

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Terms and abbreviations

Benefit	The level of contribution of a project towards a stated objective, defined for this exercise in the Methods (PPP Step 5)
Cost	Estimated total cost of a project
CFOC	Caring for our Country (Australian Government funding agency)
DEWHA	Department of Environment, Water, Heritage and the Arts
DOC	The New Zealand Government's Department of Conservation
DPIPWE	Department of Primary Industries, Parks, Water and Environment
EPBC Act	Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*
FPA	Tasmanian Forest Practices Authority
FPS	Tasmanian Forest Practices System
NRM	In this report, any or all of Tasmania's three regional Natural Resource Management agencies (Cradle Coast, North and South)
PPP	Project Prioritisation Protocol, explained in detail in the Methods section
Success	A percentage estimate of the likelihood of success of a project
TSP Act	Tasmanian *Threatened Species Protection Act 1995*
UQ	University of Queensland
UTas	University of Tasmania

Contents

Project prescriptions for all species in List 1 are supplied in a separate document.

Contract requirement

Conservation efforts for threatened flora and fauna in Tasmania have to date focused primarily on species listed on the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*, with funding by the Australian Government for the preparation and implementation of single and multi-species Recovery Plans. The three Tasmanian NRM regions had a responsibility for implementation of Recovery Plans under the NHT2 Tasmanian Bilateral Agreement. No such requirements are presently stipulated, but it is expected that ongoing investment in the implementation of recovery plan actions will continue at some level through the NRM regions, Local, State, the Australian Government and other organisations.

Budgetary constraints mean that that the recovery actions required for the 680 listed species listed as threatened under the Tasmanian *Threatened Species Protection Act 1995* cannot all be funded simultaneously. For the same reason, a large number of threatened species still lack recovery plans and many recovery plans are out of date. Some form of prioritisation of recovery actions is required, as was recommended in the *Threatened Species Strategy for Tasmania* (Parks & Wildlife Service, 2000). Apart from a priority list of recovery actions prepared in 2007 for threatened flora in the Cradle Coast NRM Region (Schahinger 2007), there has been no regional prioritisation of Recovery Plans to guide the NRM regions in planning their recovery actions. For this reason, the three NRMs contracted the Threatened Species Section to prepare a priority list of threatened species recovery actions, with documented details including locations. The outcomes of the project are relevant to all organisations involved in the coordination of threatened species recovery actions in Tasmania.

Context

A consistent Statewide approach for both flora and fauna prioritisation will enable considerable efficiencies in conducting recovery projects and also identify Statewide and cross-regional priorities for future action. This will be a valuable broad-scale tool for Statewide and cross-regional planning, with all organisations coordinating to undertake recovery actions being able to compare and contrast priorities for threatened species recovery actions.

Type of method required

Consistent. The NRMs required a consistent approach across the Regions in prioritising threatened species recovery actions. Furthermore, it was important that the method treated all threatened species consistently. Recovery plans for different species may have quite different objectives, with some simply aiming to ensure that the species does not become further threatened, while others aim to secure several populations across Australia. The reasons for these differences are varied, making prioritisation of the recommended actions difficult. Consistency also depends on the method being objective and repeatable.

Transparent. It is also particularly important that the prioritisation process is transparent. The prioritisation of threatened species recovery actions can be a contentious subject: there are a wide range of views about which species are most important, for many species there is much uncertainty surrounding their needs, and, under a limited budget, the risk of extinction will always exist. Transparency will help ensure that decisions are clearly justified and that the priority list is used appropriately.

Up-to-date. Any opportunity to identify recovery actions that are currently appropriate during the prioritisation process would be of significant advantage. A large number of threatened species still lack recovery plans and many recovery plans are out of date.

Wintle (2008) reviewed biodiversity investment prioritisation tools in terms of their appropriateness in resolving NRM prioritisation issues. This review made it clear that there remains room for improvement with all methods, and that different tools are of use for different parts of the process. The Project Prioritisation Protocol (PPP; Joseph et al. 2009) prioritises actions within an available budget, and is the only such method identified by Wintle (2008) which did not use arbitrarily scaled indices (ie a scoring system) and explicitly took into account project Cost and likelihood of Success. Since it depends on only three factors (project Benefit, likelihood of Success and Cost), focussing only on a single objective by which to gauge Benefit, it is easy to understand and provides consistency. Scoring systems addressing multiple objectives in a single prioritisation exercise can be subject to a lack of transparency, where projects with very high social importance but very low likelihood of success could score more highly than projects with, say, high urgency and likelihood of success. The PPP approach also has the advantage of identifying recovery actions for all species under consideration as part of the process tailored to a consistent prioritisation objective. The approach allows the assessment of a large number of species over a relatively short period of time.

The New Zealand government's Department of Conservation (DOC) has been applying the PPP to its threatened species objectives for the past four years, starting with the objective of minimising threatened species extinctions. A collaboration was formed between DPIPWE and the developers of the PPP from DOC and the University of Queensland (UQ), to guide the Threatened Species Section in applying this approach to Tasmania's threatened species.

How PPP works

The PPP focuses on the cost-efficiency of projects in achieving a defined objective. Where minimising threatened species extinctions is the objective, the approach identifies a project for each species which is tailored to achieve a target level of recovery, and prioritises these projects, on the basis of Benefit, likelihood of Success (feasibility) and Cost:

$$\text{Project efficiency} = \frac{\text{Benefit} \times \text{Success}}{\text{Cost}}$$

For threatened species recovery, Benefit of the project to the species is calculated as the difference between the probability of the species being secure with and without the project (details in PPP Step 5). The Benefit may thus be considered as a measure of urgency of the project. While it may initially appear that urgency should be the only guiding factor, on a limited budget not all species can be recovered at once. If some of the most urgent species are the most costly, by the time they have been recovered other species may be extinct. It is important to recognise that most threatened species are not on a steady, predictable trajectory of decline; it is more accurate to express their situation in terms of the likelihood of extinction within a stated period of years. Out of 20 species with a 5% risk of going extinct within 50 years, an average of one can be expected to go extinct in this time frame. Thus prioritisation of a few, expensive, highly urgent species may be accompanied by the loss of other, less expensive, equally urgent species. Additionally, some projects cannot be guaranteed to be successful; the method prioritises investment in the projects most likely to recover species.

Likelihood of 'Success' is considered at various levels relating to each action within a project and incorporates expressions of confidence of the estimates. Details on how these estimates are made are provided below.

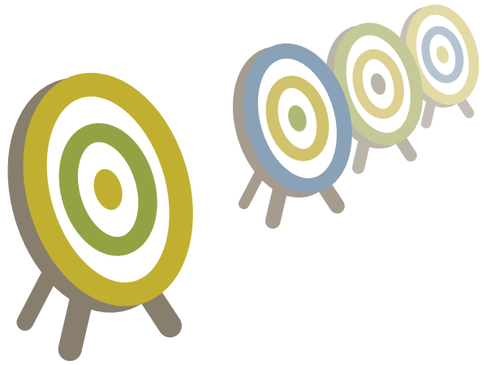
PPP steps

The PPP process in Tasmania was carried out through the following steps:

1. Define objective
2. List biodiversity assets
3. Design management projects
4. Estimate Cost and Success of each project
5. Estimate Benefit of each project
6. Review and rank the projects

Follow-up steps would likely comprise:

7. Identify resource constraints
8. Calculate cost-sharing, sensitivity analyses, choose set of projects
9. Regular iterations and full rebuild every 5 yrs



1. Define objective

Several objectives addressing Tasmanian threatened species recovery are currently being met by a range of ongoing projects (eg recovery of iconic species and the reduction of broad-scale threats). The *Threatened Species Strategy for Tasmania* (Parks & Wildlife 2000) recommends prioritising on the basis of the degree of immediate threat and a number of other criteria including endemism, keystone role and cultural significance. However, it is ineffective and confusing to prioritise projects on how they meet some combination of objectives, as the relative importance of each objective to funders can change annually. Prioritisation is most effective and transparent when addressing a single objective that is target-based, specific and with clear definitions of terms.

An objective towards the minimisation of number of extinctions was favoured, since this responds to the requirement of the Tasmanian *Threatened Species Protection Act 1995* (TSP Act) for a strategy to ensure the survival of threatened species. The wording of objectives used by DOC for prioritisation towards minimisation of number of extinctions was reviewed for use by the Threatened Species Section. Given the limited period of time available to the Threatened Species Section, it was helpful to take advantage of the substantial work carried out by DOC to develop these objectives. DOC identified two objectives towards minimising species extinctions, whereby species were secured for 50 and 300 years respectively. For this exercise, a 50 period was selected, whereby projects represent the minimum effort required to secure each species. These projects are not sufficient to secure all populations or genetic diversity of their target species. The securing of extra species was viewed as a higher priority than the securing of extra populations of an already secure species. A 50 year period was also selected for the maximum length for a project, being considered the longest period over which experts could envisage a realistic project plan. At the same time, it was recognised that the project plans, and therefore the prioritisation, would remain stable over a 5–10 year period, after which the work would require review.

The TSP Act and the National Strategy for the Conservation of Australia's Biological Diversity (ANZECC 1996) emphasise the need to conserve species in situ and in the wild, and the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) considers species translocated outside their natural range as Extinct in the Wild, and so the objective recognises this distinction.

Objective: Within 50 years, to secure in the wild in Tasmania the greatest number of threatened taxa as possible.

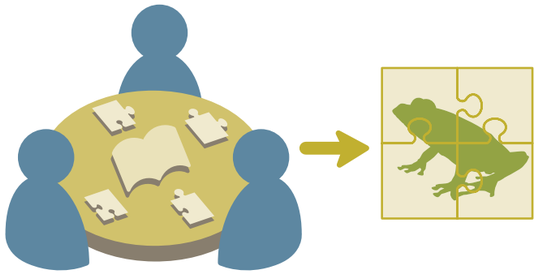
Target: A taxon is defined as secure when its numbers and distribution are stable or increasing, and are sufficient that there is a 95% probability that it will survive the stochastic events anticipated over a 50 year timeframe, given that all known and predicted threats are adequately mitigated.

2. List biodiversity assets

For the purposes of minimising extinctions, the relevant biodiversity assets were Tasmania's flora and fauna taxa. Due to time constraints, only the more threatened species were assessed: projects to secure these species are likely to be of higher Benefit than projects to secure less threatened species. This included all species listed on the EPBC Act or TSP Act as Critically Endangered, Endangered or Vulnerable.

Wide-ranging species which did not have an exclusively Tasmania-based population were excluded from the exercise since they could not be secured purely by Tasmanian projects. Macquarie Island species were also excluded as they were very unlikely to be funded by the Tasmania-based agencies for which this project was prepared. Lower order plants (14) were excluded due to a lack of expert availability, though it is anticipated that these will be considered in the project's 5-year review.

Listed taxa were not distinguished on the basis of whether they were a species or a subspecies. There is a strong argument that it is more important to secure a species than a subspecies, but also a genus might be more important than a species. The degree of difference between subspecies may also vary between different groups. This is a complex issue for which there is no simple answer, so for this prioritisation exercise each legally listed entity was considered separately.



3. Design management projects

Experts were asked to design an appropriate project to secure each species over 50 years with a probability of at least 95%. Projects had to include outcome monitoring (for species security), to allow project auditing and learning from any lack of success. Experts were required to specify location, intensity and duration of an action most likely to secure the species. Locations were typically areas where the populations considered easiest to secure were found. If that action was insufficient to secure the species with 95% probability, additional actions were specified. Where possible, two to three independent experts were brought together in a workshop to maximise coverage of information and consensus in designing a project to secure each species. An interviewer asked standardised questions, entering answers including location polygons onto a database developed by DOC. Consistency across species was maximised by the use of only two regularly communicating interviewers for the whole process. Where opinions diverged, the interviewer worked through the justifications for each opinion with the experts until consensus was reached, recording any differences of opinions that remained at the end of the discussion. Where workshops were not possible, one-to-one interviews were conducted, but wherever available more than one expert was consulted.

As discussed in the section on the objective, projects were required to secure species in the wild, within their natural range. If it was considered impossible to attain security in this way, experts designed a project where the species was secured in areas at as short a distance from its known natural range as possible, recognising that there may be limited information on precise boundaries to a species' historical natural range, and that many of these projects will actually occur in areas where the species either has existed or could be reasonably expected to exist.

4. Estimate Cost and Success of each project

For each recommended action, cost and likelihood of success were estimated, in dollars and percentage probability respectively, by those with most experience in that action. These were not necessarily the species experts. With the aid of the database, it was possible to ensure that cost and success estimates of similar actions were consistent across species unless there was a key difference (for example relating to the location or precise function of the action). All estimates were conservative to ensure that the project would be successful. Estimates were given at today's prices; inflation was not taken into account.

Success estimates divided into 'input success', 'output success' and 'outcome success', whereby experts in the relevant methods were asked to estimate the likelihood for each and indicate their confidence around this. Input success relates to whether the proposed method for the action can be done; output success relates to whether it will be carried out effectively; outcome success relates to how effectively it will help the species as intended.

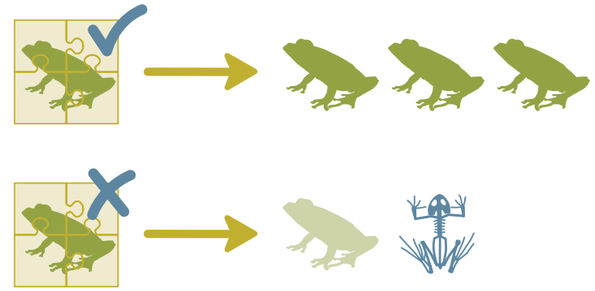
For each project, costs of actions were summed and probabilities of success of actions were multiplied, to provide an overall estimate of project Cost and Success.

Excluded costs In general, costing was conservative to ensure that the project would be achieved. However, three groups of costs were not estimated and will need to be added as appropriate when applying for the funds: output monitoring (unless deemed an essential part of carrying out the action); car travel (purchase, fuel and running costs, food and accommodation); project management (all aspects of salaries, super etc. were included, but not the costs of running an office, including computers, software, administration, human resources). Many actions required the employment of a member of staff for a few days each year, and in costing this, it was assumed that this employment would be shared with other projects – the expense of hiring a member of staff purely for the single action was not covered. Car travel costs and project management were deemed to be dependent on the organisation carrying out the project. We strongly recommend output monitoring (monitoring to ensure that each action is effective, eg that a rabbit-proof fence really does exclude rabbits), so that any unsuccessful project can be properly re-designed. However, we acknowledge that funds will not always be available to support this. Fully costed budgets would provide greater accuracy for species near the funding allocation cut-off line, but obtaining these was beyond the scope of the project. It is advisable for funders to incorporate a contingency fund providing flexibility for the above costs and for new information emerging once the projects have started.

Actions that were already funded, or which were specifically the legal obligation of an agency, were also not costed.

Although the above list of excluded costs suggests that final costs may be higher than the provided estimates, cost-sharing (PPP Step 8) may reduce them.

Methods to manage potential inaccuracies in estimates are also discussed in PPP Step 8.



5. Estimate Benefit of each project

For threatened species recovery, Benefit of the project to the species (n) is calculated by taking B_n (the estimated probability of the species reaching the target level of security without any actions) away from the target 95% probability that the prescribed project would achieve, ie:

Project Benefit = 95 – B_n

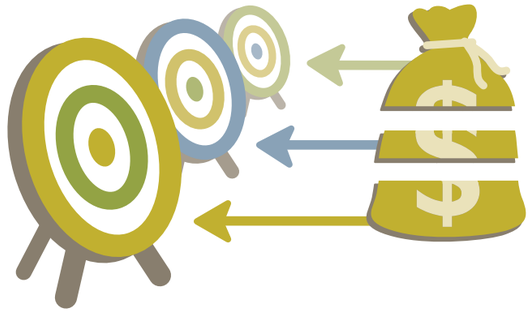
Since knowledge of many threatened species is not sufficient to estimate parameters for population viability models, experts were asked to estimate security probabilities directly.

6. Review and rank the projects

The interviewers reviewed the data and, with the aid of the database, ensured that estimates relating to similar actions were consistent across species. The database generated management prescriptions describing the prescribed project for each species. A page is devoted to each action within the project, with estimates of cost and success and a map of its recommended location. Final versions of the projects were presented to the lead expert on each taxon for review.

Projects were ranked on the basis of their Benefit, Success and Cost as described above (Methods: How PPP works).

This report presents the findings of the above six steps. Likely subsequent application is described in the steps below.



7. Identify resource constraints

The primary constraints on resource allocation are:

1. The total budget available for the management of threatened species;
2. Separate organisational or funding objectives which need to be met as part of the resource allocation.

Once these are known, the highest priority projects that can be funded within the budget and consistent with separate funding or organisational objectives are selected for full long-term funding. Fluctuations in annual budgets or external funding opportunities may mean that some projects are not properly funded every year, but the design of these can be reviewed in light of this and incorporated in a re-run of the prioritisation exercise. Most projects involve a large outlay in initial years, and then a much smaller commitment over the longer term. After this initial outlay, funds are likely to be available for the next projects on the priority list.

Some funding and organisational objectives (including those of Caring for our Country [CFOC]) cannot be addressed by the prioritisation exercise as they are multiple and change on each funding round. To minimise extinctions within this constraint, it is recommended that, for each funding round, the highest ranking projects that meet the CFOC objectives and align with the objectives of relevant programs are identified, and partnerships developed to apply for full funding for each.

8. Calculate cost-sharing, sensitivity analyses, choose set of projects

Cost-sharing estimates can only be completed once the budget is known, so that it is clear how many projects can be funded and where the potential for cost-sharing lies. For greatest cost-efficiency, this exercise should be carried out by a coordinating agency to ensure there is no overlap in funding.

It may seem initially appealing to share costs among all similar actions, regardless of whether the rest of each project will be funded. However, partial funding of a low-ranking project is an inefficient use of funds to minimise extinctions. By the time full funding is available for the project, circumstances have changed and the project may take a very different form. Alternatively, the partial funding may be insufficient to prevent extinction of the species before full funding is available.

UQ and DOC have developed software to ensure the fair sharing of costs between projects. The way costs are shared will depend on the action – for example, the sharing of costs between two projects requiring different areas (eg 1 ha versus 8 ha) of fencing in the same place will be different from the sharing of costs between projects requiring someone to negotiate for the covenanting of two different areas on the same property. Once cost-sharing has been calculated, the saved costs may allow the funding of an additional project. Thus originally, there may have been funds available for Projects 1 to 8, with money left over that was insufficient to cover Project 9. After sharing costs of actions within Projects 1 to 8, there may be sufficient funds to cover Project 9 as well.

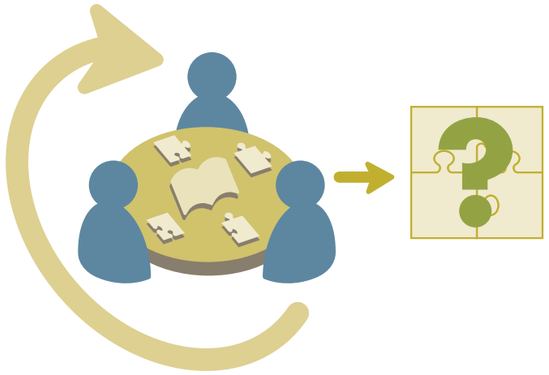
In the long term, DOC aims to calculate cost-sharing between projects across, as well as within, objectives.

Because cost-sharing depends on budget allocation, it cannot be calculated as part of this report, but there may be opportunities to carry it out in future. It is important to understand that cost-sharing may change the project rankings.

Quality of estimates affects the ranking, and thus which projects are funded in any given year. In many cases, only rough estimates can be provided by experts, though these will be sufficient to give an approximate ranking. Only after funds have been allocated to the list will the cut-off be apparent, in terms of the number of the highest ranking projects that can be funded. At this time, sensitivity analyses can be carried out to identify any projects that are sufficiently close to this cut-off that additional information will affect whether they are funded or not. A review of the design and estimates of these projects will then be appropriate.

Once the projects to be funded are selected, agencies can then be identified to carry them out. DOC is currently at this stage. These agencies should be consulted to confirm estimates of project Cost and Success and to calculate the previously excluded costs described above.

Where multiple funders are involved in applying the prioritisation list, it will be essential to ensure that resource allocation to priority projects is well coordinated. This could be mediated through regular NRM workshops and by the Threatened Species Section recording funding commitments and implementation of recovery actions on the database.



9. Regular iterations and full rebuild every 5 yrs

It is recommended that the prioritisation exercise is repeated every 5 years, in light of project progress, new information and changing threats. This process is likely to be quicker than the initial exercise, since experts and projects have already been identified and those applying the method are now familiar with its application. Between reviews, new information can also be entered on the database as it emerges.

Results

Forty-eight experts contributed to the design of projects to secure Tasmania's threatened species, as listed in the Acknowledgements. In total, 318 species were considered in the initial assessment for the process (Table 1), comprising those listed as Critically Endangered, Endangered or Vulnerable under at least one of the TSP Act and EPBC Act. Of these, 171 species were fully assessed for prioritisation (List 1), including the development of a project for each to secure it over a 50 year period with 95% probability. The remaining species were either viewed as data deficient, not possible to secure through Tasmanian NRM-funded projects or already secure. These are described further below, and listed in the Appendix.

For each of the species on List 1, project prescriptions are provided in a separate document accompanying this report. Each prescription comprises a summary cover page and a page with details of each action, including location.

Table 1. Threatened species considered during the PPP process

All species considered were listed as Critically Endangered, Endangered or Vulnerable under at least one of the TSP Act and EPBC Act. Species that were ranked under the PPP process are listed as "yes". Species considered to be already secure in the wild are listed as "No benefit". Species which could not be secured in the wild within 50 years are listed as "< 95%". Where data were insufficient to make assessments and, therefore, species were not ranked, they were listed as "Data Deficient". Species that were excluded for other reasons are listed as "Excluded". Further details of these categories are provided in the text, and lists of the species in each category are provided in the Appendix.

TSP Act terms: **e**ndangered; **v**ulnerable; **r**are; **n**ot **l**isted under the TSP Act.

EPBC Act terms: **EX**tinct in the wild (Pedder galaxias); **CR**itically endangered; **EN**dangered; **VU**lnerable; **M**arine **M**igratory; **N**ot **L**isted under the EPBC Act.

	TSP Act				
Species	e	v	r	n/l	Total
yes	111	56	3	1	171
No benefit	25	31	2	2	60
< 95%	9	2			11
Data deficient	32	8	1	4	45
Excluded	11	11	2	7	31
Total	188	108	8	14	318

	EPBC Act						
Species	EX	CR	EN	VU	MM	N/L	Total
yes	1	20	41	25	1	83	171
No benefit		5	10	9		36	60
< 95%		2	4			5	11
Data deficient		7		6		32	45
Excluded			8	18		5	31
Total	1	34	63	58	1	161	318

List 1: Prioritised threatened fauna and flora projects

Rank indicates the order in which projects should be initiated in order to minimise extinctions. Other threatened species projects may be of great value for other objectives and should not be disregarded on the basis of being absent or low priority on this list. Estimates are based on expert opinion using current available information. The 50-year cost estimates exclude project management, car travel, and some output monitoring and cost-sharing calculations, as explained in the Methods (PPP Steps 4 & 8). TSP and *EPBCA 1999* terms are as for Table 1. Project location is indicated under NRM Projects: Cradle Coast (CC), North (N) and South (S).

Species	Common name	Benefit	Success	Cost ($M)	B*S/C	Rank	TSP Act	EPBC Act	Tas endemic	NRM endemic	Cumulative cost ($M)	NRM Projects
Prasophyllum limnetes	marsh leek-orchid	0.70	0.90	0.0232	27.17	1	e		end	CC	0.0232	CC
Euphrasia semipicta Type 3	peninsula eyebright	0.25	0.85	0.0088	24.05	2	e	EN	end	S	0.0320	S
Beddomeia fultoni	Hydrobiid Snail (Farnhams Creek)	0.55	0.70	0.0205	18.80	3	e		end	CC	0.0525	CC
Beddomeia petterdi	Hydrobiid Snail (Blyth River)	0.65	0.90	0.0499	11.72	4	e		end	CC	0.1024	CC&S
Cyathea Xmarcescens	skirted treefern	0.20	0.77	0.0138	11.06	5	e				0.1163	N
Caladenia tonellii	robust fingers	0.25	0.69	0.0157	10.96	6	e	CR	end		0.1320	CC
Prasophyllum atratum	three hummock leek-orchid	0.80	0.85	0.0771	8.82	7	e		end	CC	0.2091	CC
Thelymitra atronitida	blackhood sun-orchid	0.85	0.34	0.0370	7.90	8	e			S	0.2461	S
Leptorhynchos elongatus	lanky buttons	0.60	0.48	0.0368	7.86	9	e				0.2829	S
Euphrasia semipicta Type 1	peninsula eyebright	0.25	0.51	0.0165	7.72	10	e	EN	end	S	0.2994	S
Craspedia preminghana	preminghana billybuttons	0.25	0.73	0.0237	7.69	11	e	EN	end	CC	0.3231	CC
Beddomeia averni	Hydrobiid Snail (West Gawler)	0.55	0.26	0.0183	7.66	12	e		end	CC	0.3414	CC
Zieria veronicea subsp. *veronicea*	pink zieria	0.20	0.85	0.0223	7.62	13	e				0.3638	N
Ozothamnus reflexifolius	reflexed everlastingbush	0.15	0.81	0.0173	7.03	14	v	VU	end	S	0.3810	S
Micropathus kiernani	Cave Cricket	0.45	0.90	0.0581	6.97	15	e		end	S	0.4391	S
Polyscias aff. *sambucifolia* (Douglas-Denison)	ferny panax	0.25	0.80	0.0295	6.78	16	e				0.4686	N&S
Beddomeia hermansi	Hydrobiid Snail (Viking Creek)	0.85	0.31	0.0406	6.41	17	e		end	CC	0.5092	CC
Caladenia campbellii	thickstem fairy fingers	0.70	0.34	0.0390	6.10	18	e	CR	end	CC	0.5483	CC
Chiloglottis trapeziformis	broadlip bird-orchid	0.90	0.43	0.0656	5.95	19	e				0.6139	CC
Pterostylis rubenachii	arthur river greenhood	0.15	0.81	0.0206	5.89	20	e	EN	end	CC	0.6345	CC
Tricoryne elatior	yellow rushlily	0.15	0.77	0.0211	5.43	21	v				0.6556	N
Hibbertia basaltica	basalt guineaflower	0.30	0.61	0.0339	5.41	22	e	EN	end	S	0.6895	S
Prasophyllum tunbridgense	tunbridge leek-orchid	0.45	0.53	0.0440	5.38	23	e	EN	end		0.7336	N&S
Euphrasia fragosa	shy eyebright	0.65	0.30	0.0371	5.30	24	e	CR	end	S	0.7707	S
Prasophyllum incorrectum	golfers leek-orchid	0.10	0.90	0.0174	5.19	25	e	CR	end	N	0.7880	N
Ranunculus prasinus	midlands buttercup	0.25	0.81	0.0392	5.17	26	e	EN	end	N	0.8272	N
Thelymitra jonesii	skyblue sun-orchid	0.10	0.73	0.0152	4.80	27	e	CR	end		0.8424	S
Hoplogonus bornemisszai	Bornemissza's Stag Beetle	0.45	1.00	0.0949	4.74	28	e	CR	end	N	0.9373	N
Hoplogonus vanderschoori	Vanderschoor's Stag Beetle	0.45	1.00	0.0949	4.74	29	v		end	N	1.0321	N
Doodia caudata	small raspfern	0.15	0.80	0.0266	4.50	30	e				1.0588	CC&N
Tmesipteris parva	small forkfern	0.25	0.50	0.0283	4.42	31	v				1.0871	N
Lepidium hyssopifolium	soft peppercress	0.45	0.42	0.0453	4.19	32	e	EN			1.1323	N&S
Eucalyptus morrisbyi	morrisbys gum	0.25	0.75	0.0459	4.09	33	e	EN	end	S	1.1782	S
Stackhousia subterranea	grassland candles	0.20	0.81	0.0406	3.99	34	e				1.2187	N
Euphrasia gibbsiae subsp. *psilantherea*	swamp eyebright	0.80	0.36	0.0738	3.92	35	e	CR	end	S	1.2926	S
Spyridium eriocephalum var. *eriocephalum*	heath dustymiller	0.15	0.69	0.0265	3.90	36	e				1.3191	S
Hardenbergia violacea	purple coralpea	0.80	0.24	0.0502	3.85	37	e			S	1.3693	S
Epacris limbata	bordered heath	0.20	0.43	0.0228	3.80	38	e	CR	end		1.3921	N&S
Pneumatopteris pennigera	lime fern	0.55	0.34	0.0495	3.75	39	e				1.4416	CC
Epacris exserta	south esk heath	0.15	0.68	0.0274	3.72	40	e	EN	end		1.4690	N
Pterostylis commutata	midlands greenhood	0.90	0.34	0.0828	3.67	41	e	CR	end		1.5518	N&S
Prasophyllum olidum	pungent leek-orchid	0.85	0.36	0.0854	3.58	42	e	CR	end	N	1.6372	N
Velleia paradoxa	spur velleia	0.10	0.90	0.0252	3.57	43	v				1.6624	S
Stackhousia pulvinaris	alpine candles	0.15	0.81	0.0346	3.51	44	v			CC	1.6971	CC
Persicaria subsessilis	bristly waterpepper	0.45	0.54	0.0693	3.48	45	e			N	1.7664	N
Hibbertia calycina	lesser guineaflower	0.10	0.81	0.0233	3.47	46	v			N	1.7897	N
Pultenaea humilis	dwarf bushpea	0.05	0.85	0.0124	3.42	47	v				1.8021	N
Boronia hippopala	velvet boronia	0.05	0.90	0.0141	3.19	48	v	VU	end		1.8162	N

Species	Common name	Benefit	Success	Cost ($M)	B*S/C	Rank	TSP Act	EPBC Act	Tas endemic	NRM endemic	Cumulative cost ($M)	NRM Projects
Vittadinia australasica var. *oricola*	coast new-holland-daisy	0.25	0.68	0.0560	3.03	49	e			CC	1.8722	CC
Hydrocotyle laxiflora	stinking pennywort	0.20	0.81	0.0544	2.98	50	v			S	1.9266	S
Austrochloritis victoriae	Southern Hairy Red Snail	0.15	0.64	0.0338	2.84	51	v				1.9604	CC
Phebalium daviesii	davies waxflower	0.80	0.49	0.1504	2.59	52	e	CR	end	N	2.1108	N
Hoplogonus simsoni	Simson's Stag Beetle	0.45	0.60	0.1055	2.56	53	v		end	N	2.2163	N
Viminaria juncea	golden spray	0.60	0.26	0.0647	2.44	54	e			S	2.2810	S
Lycopus australis	australian gypsywort	0.10	0.65	0.0269	2.42	55	e				2.3079	CC&N
Chionohebe ciliolata	ben lomond cushionplant	0.05	0.90	0.0187	2.40	56	v	VU	Tas	N	2.3266	N
Stonesiella selaginoides	clubmoss bushpea	0.10	0.59	0.0248	2.36	57	e	EN	end		2.3515	N
Epacris grandis	tall heath	0.05	0.85	0.0197	2.16	58	e	EN	end		2.3712	N
Leucochrysum albicans subsp. *albicans* var. *tricolor*	grassland paperdaisy	0.15	0.56	0.0389	2.15	59	e	EN			2.4101	CC,N&S
Boronia hemichiton	mt arthur boronia	0.15	0.49	0.0341	2.14	60	e	VU	end	N	2.4442	N
Eryngium ovinum	blue devil	0.05	0.90	0.0211	2.13	61	v			S	2.4653	S
Corunastylis nudiscapa	bare midge-orchid	0.10	0.54	0.0256	2.11	62	e			S	2.4909	S
Pultenaea mollis	soft bushpea	0.05	0.90	0.0215	2.09	63	v			N	2.5125	N
Lobelia pratioides	poison lobelia	0.10	0.59	0.0284	2.08	64	v				2.5409	N&S
Pherosphaera hookeriana	drooping pine	0.05	0.90	0.0219	2.05	65	v		end		2.5628	S
Bertya tasmanica subsp. *tasmanica*	tasmanian bertya	0.10	0.61	0.0296	2.05	66	e	EN	end		2.5924	N&S
Spyridium lawrencei	small-leaf dustymiller	0.05	0.69	0.0172	2.01	67	v	EN	end		2.6096	N&S
Euphrasia scabra	yellow eyebright	0.15	0.50	0.0385	1.95	68	e				2.6481	N
Limonium baudinii	tasmanian sea-lavender	0.10	0.81	0.0429	1.89	69	v	VU	end	S	2.6910	S
Prasophyllum castaneum	chestnut leek-orchid	0.25	0.40	0.0540	1.84	70	e	CR	end	S	2.7449	S
Epacris apsleyensis	apsley heath	0.05	0.72	0.0197	1.83	71	e	EN	end		2.7646	N&S
Hypolepis distans	scrambling groundfern	0.10	0.90	0.0496	1.82	72	e	EN	Tas	CC	2.8142	CC
Brachyscome rigidula	cutleaf daisy	0.10	0.59	0.0333	1.76	73	v				2.8475	S
Scleranthus diander	tufted knawel	0.10	0.59	0.0333	1.76	74	v				2.8807	S
Gompholobium ecostatum	dwarf wedgepea	0.15	0.64	0.0545	1.75	75	e			N	2.9352	N
Conospermum hookeri	tasmanian smokebush	0.05	0.77	0.0223	1.71	76	v	VU	end		2.9576	S

Species	Common name	Benefit	Success	Cost ($M)	B*S/C	Rank	TSP Act	EPBC Act	Tas endemic	NRM endemic	Cumulative cost ($M)	NRM Projects
Mentha australis	river mint	0.05	0.72	0.0214	1.69	77	e				2.9789	CC
Discaria pubescens	spiky anchorplant	0.20	0.36	0.0428	1.68	78	e				3.0218	S
Euphrasia sp. '*fabula*'	masked cliff-eyebright	0.15	0.36	0.0340	1.58	79	e	EN	end	S	3.0557	S
Euphrasia phragmostoma	hairy cliff-eyebright	0.05	0.35	0.0111	1.57	80	v	VU	end	S	3.0669	S
Calystegia marginata	forest bindweed	0.20	0.41	0.0521	1.56	81	e			N	3.1189	N
Alternanthera denticulata	lesser joyweed	0.20	0.54	0.0699	1.53	82	e			N	3.1888	N
Cryptostylis leptochila	small tongue-orchid	0.10	0.45	0.0296	1.52	83	e			N	3.2184	N
Mirbelia oxylobioides	sandstone bushpea	0.10	0.69	0.0462	1.49	84	v			S	3.2645	S
Miselaoma weldi	Stanley Snail	0.10	0.70	0.0490	1.43	85	e		end	CC	3.3135	CC
Thelymitra malvina	mauvetuft sun-orchid	0.10	0.59	0.0417	1.40	86	e				3.3553	CC&S
Beddomeia wiseae	Hydrobiid Snail (Blizzards Creek)	0.75	0.34	0.1848	1.38	87	v		end	CC	3.5401	CC
Austrodanthonia popinensis	blue wallabygrass	0.10	0.68	0.0503	1.35	88	e	EN	end		3.5904	S
Thelymitra benthamiana	blotched sun-orchid	0.55	0.37	0.1590	1.27	89	e			N	3.7493	N
Euphrasia collina subsp. *tetragona*	northcoast eyebright	0.15	0.61	0.0731	1.26	90	e			CC	3.8225	CC
Catadromus lacordairei	Catadromus Carabid Beetle	0.25	0.43	0.0897	1.18	91	v				3.9122	CC&N
Parvulastra vivipara	Live-bearing Seastar	0.45	0.40	0.1546	1.17	92	v	VU	end		4.0668	CC&S
Thryptomene micrantha	ribbed heathmyrtle	0.05	0.81	0.0350	1.16	93	v				4.1018	S
Eucalyptus gunnii subsp. *divaricata*	miena cider gum	0.85	0.25	0.1866	1.14	94	e	EN	end	S	4.2884	S
Isoetopsis graminifolia	grass cushion	0.05	0.65	0.0298	1.09	95	e				4.3182	S
Triptilodiscus pygmaeus	dwarf sunray	0.05	0.65	0.0298	1.09	96	v				4.3481	S
Asplenium hookerianum	maidenhair spleenwort	0.05	0.69	0.0320	1.07	97	e	VU			4.3801	CC,N&S
Caladenia saggicola	sagg spider-orchid	0.70	0.25	0.1616	1.07	98	e	CR	end	S	4.5417	S
Centrolepis pedderensis	pedder bristlewort	0.20	0.42	0.0830	1.01	99	e	EN	end	S	4.6246	S
Spyridium obcordatum	creeping dustymiller	0.10	0.24	0.0239	1.01	100	v	VU	end		4.6485	N
Epacris stuartii	southport heath	0.20	0.42	0.0853	0.99	101	e	CR	end	S	4.7338	S
Euphrasia amphisysepala	shiny cliff-eyebright	0.05	0.42	0.0214	0.98	102	r	VU	end	S	4.7551	S
Pterostylis wapstrarum	fleshy greenhood	0.55	0.16	0.0985	0.92	103	e	CR	end		4.8536	N&S
Epacris glabella	smooth heath	0.05	0.85	0.0494	0.86	104	e	EN	end		4.9030	CC

Species	Common name	Benefit	Success	Cost ($M)	B*S/C	Rank	TSP Act	EPBC Act	Tas endemic	NRM endemic	Cumulative cost ($M)	NRM Projects
Caladenia prolata	white fingers	0.05	0.68	0.0398	0.86	105	e			N	4.9427	N
Caladenia aurantiaca	orangetip fingers	0.05	0.68	0.0401	0.85	106	e				4.9828	N
Epacris barbata	bearded heath	0.05	0.54	0.0331	0.82	107	e	EN	end	S	5.0160	S
Philotheca freyciana	freycinet waxflower	0.05	0.36	0.0229	0.80	108	e	EN	end	S	5.0389	S
Lissotes menalcas	Mt. Mangana Stag Beetle	0.15	0.80	0.1528	0.79	109	v		end		5.1917	S
Boronia gunnii	river boronia	0.05	0.45	0.0299	0.75	110	v	VU	end	N	5.2216	N
Glycine latrobeana	clover glycine	0.05	0.73	0.0493	0.74	111	v	VU			5.2709	N&S
Amelora acontistica	Chevron Looper Moth	0.20	1.00	0.2887	0.69	112	v				5.5596	N&S
Prasophyllum secutum	northern leek-orchid	0.15	0.37	0.0817	0.69	113	e	EN	end		5.6413	CC&N
Corunastylis morrisii	bearded midge-orchid	0.20	0.15	0.0466	0.65	114	e				5.6878	S
Pasmaditta jungermanniae	Snail (Cataract Gorge)	0.05	0.65	0.0502	0.65	115	v		end	N	5.7380	N
Antipodia chaostola	Chaostola Skipper	0.25	0.64	0.2634	0.60	116	e				6.0014	S
Oreixenica ptunarra	Ptunarra Brown Butterfly	0.65	0.80	0.8615	0.60	117	v		end	S	6.8629	CC,N&S
Chorizandra enodis	black bristlesedge	0.30	0.07	0.0383	0.56	118	e			N	6.9012	N
Engaeus yabbimunna	Burrowing Crayfish (Burnie)	0.45	0.58	0.5372	0.49	119	v	VU	end	CC	7.4384	CC
Engaeus spinicaudatus	Scottsdale Burrowing Crayfish	0.85	0.50	0.8843	0.48	120	e	EN	end	N	8.3226	N
Prasophyllum milfordense	milford leek-orchid	0.70	0.11	0.1616	0.48	121	e	CR	end	S	8.4842	S
Xanthorrhoea arenaria	sand grasstree	0.10	0.47	0.1013	0.47	122	v	VU	end		8.5855	N&S
Beddomeia hallae	Hydrobiid Snail (Buttons Rivulet)	0.75	0.08	0.1315	0.46	123	e		end	CC	8.7170	CC
Onchotelson spatulatus	Isopod (Great Lake)	0.25	0.55	0.2985	0.46	124	e		end	S	9.0155	S
Galaxias fontanus	Swan Galaxias	0.85	0.39	0.7278	0.46	125	e	EN	end		9.7433	CC,N&S
Beddomeia capensis	Hydrobiid Snail (Table Cape)	0.75	0.08	0.1408	0.44	126	e		end	CC	9.8841	CC
Oreisplanus munionga larana	Marrawah Skipper	0.45	0.30	0.3112	0.43	127	e		end	CC	10.1953	CC
Cheilanthes distans	bristly rockfern	0.45	0.06	0.0613	0.42	128	e			N	10.2566	N
Beddomeia phasianella	Hydrobiid Snail (Keddies Creek)	0.45	0.26	0.2910	0.39	129	v		end	CC	10.5476	CC
Callitris oblonga subsp. *oblonga*	south esk pine	0.15	0.80	0.3091	0.39	130	v	EN	end		10.8567	N&S

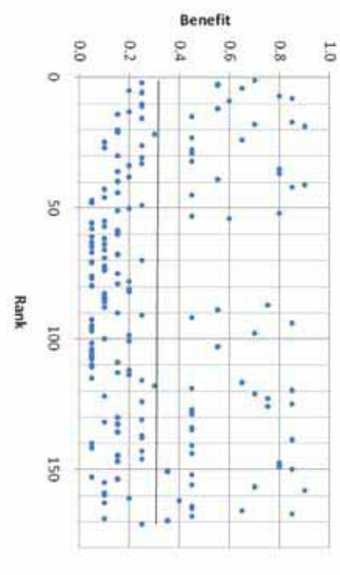
Species	Common name	Benefit	Success	Cost ($M)	B*S/C	Rank	TSP Act	EPBC Act	Tas endemic	NRM endemic	Cumulative cost ($M)	NRM Projects
Paragalaxias eleotroides	Great Lake Paragalaxias	0.25	0.55	0.3623	0.38	131	v	VU	end	S	11.2190	S
Epacris virgata (Beaconsfield)	pretty heath	0.10	0.19	0.0523	0.37	132	v	EN	end		11.2713	N
Caladenia anthracina	blacktip spider-orchid	0.45	0.16	0.2083	0.35	134	e	CR	end		11.7444	N
Myriophyllum integrifolium	tiny watermilfoil	0.45	0.09	0.1230	0.32	135	v				11.8673	N
Cryptandra amara	pretty pearlflower	0.15	0.18	0.0864	0.31	136	e				11.9537	S
Sagina diemensis	tasmanian pearlwort	0.25	0.14	0.1117	0.31	137	e	EN	end	S	12.0655	S
Zearaja maugeana	Port Davey Skate	0.25	0.19	0.1678	0.28	138	e	EN	end		12.2332	CC
Perameles gunnii gunnii	Eastern Barred Bandicoot (Tasmania)	0.85	0.52	1.6774	0.26	139		VU			13.9107	CC,N&S
Prasophyllum crebriflorum	crowded leek-orchid	0.05	0.41	0.0785	0.26	140	e	EN	end		13.9891	S
Galaxias auratus	Golden Galaxias	0.45	0.42	0.7617	0.25	141	r	EN	end	S	14.7509	S
Xanthorrhoea bracteata	shiny grasstree	0.05	0.47	0.1013	0.23	142	v	EN	end	N	14.8522	N
Haloniscus searlei	Salt Lake Slater	0.25	0.17	0.1926	0.22	143	e				15.0448	N&S
Aquila audax fleayi	Wedge-tailed Eagle	0.45	0.69	1.6006	0.19	144	e	EN	end		16.6453	CC,N&S
Paragalaxias dissimilis	Shannon Paragalaxias	0.15	0.55	0.4796	0.17	145	v	VU	end	S	17.1249	S
Galaxias tanycephalus	Saddled Galaxias	0.25	0.44	0.7158	0.15	146	v	VU	end	S	17.8407	S
Engaeus orramakunna	Mt. Arthur Burrowing Crayfish	0.15	0.58	0.5820	0.15	147	v	VU	end	N	18.4227	N
Sterna nereis nereis	Fairy Tern	0.80	0.28	1.6176	0.14	148	v				20.0403	CC,N&S
Sterna albifrons sinensis	Little Tern	0.80	0.28	1.6211	0.14	149	e				21.6614	CC,N&S
Engaeus granulatus	Central North Burrowing Crayfish	0.85	0.29	1.7924	0.14	150	e	EN	end		23.4538	CC&N
Paragalaxias mesotes	Arthurs Paragalaxias	0.35	0.37	0.9934	0.13	151	e	EN	end	S	24.4472	S
Tetratheca gunnii	shy pinkbells	0.45	0.08	0.2863	0.13	152	e	CR	end	N	24.7335	N
Oreoporanthera petalifera	mountain poranthera	0.05	0.25	0.1097	0.11	153	v	VU	end	S	24.8432	S
Thalassarche cauta	Shy Albatross	0.15	0.80	1.9590	0.06	154	v	VU	bend		26.8022	CC,N&S
Galaxias parvus	Swamp Galaxias	0.10	0.25	0.4291	0.06	155	v	VU	end	S	27.2313	S
Lomatia tasmanica	kings lomatia	0.45	0.01	0.0953	0.06	156	e	CR	end	S	27.3265	S
Astacopsis gouldi	Giant Freshwater Crayfish	0.70	0.38	5.2238	0.05	157	v	VU	end		32.5504	CC&N

Species	Common name	Benefit	Success	Cost ($M)	B*S/C	Rank	TSP Act	EPBC Act	Tas endemic	NRM endemic	Cumulative cost ($M)	NRM Projects
Thynninorchis nothofagicola	myrtle elbow orchid	0.90	0.02	0.2867	0.05	158	e	CR	end	S	32.8370	S
Galaxias johnstoni	Clarence Galaxias	0.10	0.52	1.3035	0.04	159	e	EN	end	S	34.1406	S
Prasophyllum apoxychilum	tapered leek-orchid	0.10	0.09	0.2550	0.04	160	e	EN	end		34.3955	N
Litoria raniformis	Green and Golden Frog	0.20	0.31	2.3240	0.03	161	v	VU			36.7195	CC,N&S
Brachionichthys hirsutus	Spotted Handfish	0.40	0.29	4.6753	0.03	162	e	EN	end		41.3948	CC&S
Galaxias pedderensis	Pedder Galaxias	0.10	0.21	1.0266	0.02	163	e	EX	end	S	42.4214	S
Beddomeia launcestonensis	Hydrobiid Snail (Cataract Gorge)	0.45	0.07	2.2610	0.01	164	e		end	N	44.6823	N
Haliaeetus leucogaster	White-bellied Sea-Eagle	0.45	0.10	4.0649	0.01	165	v	MM			48.7472	CC,N&S
Pseudomys novaehollandiae	New Holland Mouse	0.65	0.19	13.3566	0.01	166	e				62.1038	CC,N&S
Sarcophilus harrisii	Tasmanian Devil	0.85	0.50	50.8049	0.01	167	e	EN	end		112.9087	CC,N&S
Niveoscincus palfreymani	Pedra Branca Skink	0.45	0.14	10.2061	0.01	168	e	VU	end	S	123.1148	CC,N&S
Prototroctes maraena	Australian Grayling	0.10	0.21	4.1528	0.01	169	v	VU			127.2676	CC,N&S
Galaxiella pusilla	Dwarf Galaxias	0.35	0.04	3.6625	0.00	170	v	VU			130.9301	CC,N&S
Dasyurus maculatus maculatus	Spotted-tailed Quoll	0.25	0.09	24.3799	0.00	171	r	VU			155.3100	CC,N&S

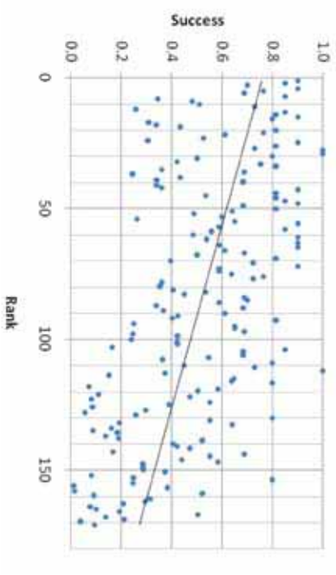
Benefit shows no trend with rank, Success tends to decrease with rank, and Cost increases significantly for most of the lowest ranked projects (Figure 1a–e). The total estimated cost of all 171 prioritised projects across the 50 year period was approximately $155 million (Figure 1e).

Figure 1. Project Benefit, Success and Cost relationship with rank

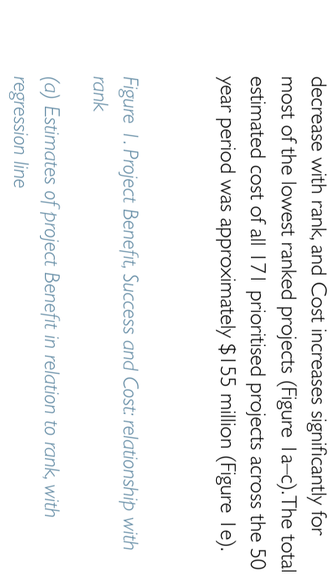
(a) Estimates of project Benefit in relation to rank, with regression line



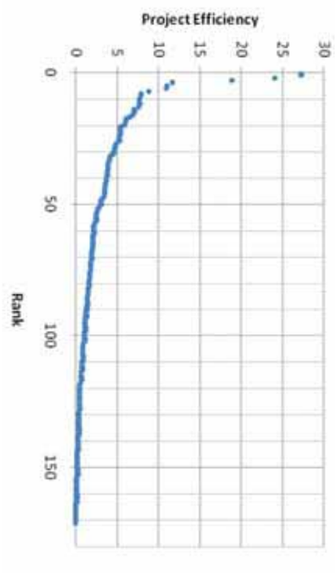
(b) Estimates of project Success in relation to rank, with regression line



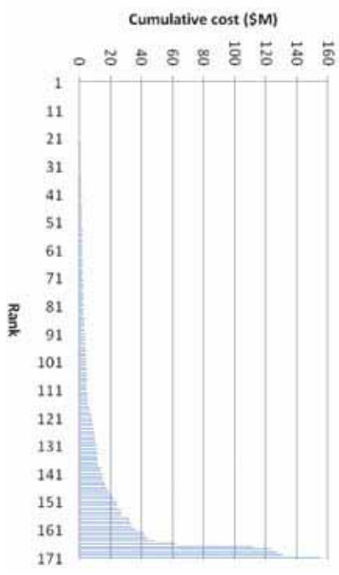
(c) Estimates of project Cost in relation to rank



(d) Estimates of Project Efficiency in relation to rank



(e) Cumulative cost ($M) of projects



Identification of the actions most commonly recommended was limited by the choice of action headings in the database used, since these headings were designed for New Zealand. However, a cursory analysis indicates that more than 10 projects selected each of the following actions as part of the management required to secure a species: covenants, ecological burns, translocations, public education, negotiation with councils, landowners and forestry agencies and weed control. The application of this finding is explored in the Discussion and in Potential Misuses of the Priority List.

Many projects required some initial research or a feasibility study in order to direct the actions more precisely. In this case, costs of actions were especially likely to be overestimated, and success underestimated, in order to ensure that the overall project had a 95% probability of securing the species. As perhaps the most extreme example, actions to secure the Tasmanian devil in the wild included the establishment of a number of fences across large tracts of land. These would need to cross rivers and roads, and extend onto the coast line, so that devils were entirely blocked from bringing disease into fenced off areas. Extensive negotiation with landowners would thus be necessary prior to deciding the position of the fences, without which the number of expensive items, such as river crossings required, can only be approximately guessed.

The projects are broken down in Table 2 according to their location in NRM regions, from the information presented in List 1. One hundred and twenty-seven projects are located in a single region, while 44 are shared across regions.

Table 2. Breakdown of projects across NRM regions

NRM projects	Total
Cradle Coast	26
North	43
South	58
Cradle Coast & North	6
Cradle Coast & South	4
North & South	16
All regions	18
Grand Total	**171**

One hundred and forty-two species considered for assessment were ultimately excluded from the prioritisation process (Table 1). These species are listed in the Appendix. In the case of 45 'data-deficient' species (List 2, Appendix), experts did not feel confident that they currently knew enough about a species' needs to design a project to secure it, even if that project might include some initial research. Most of these species have only been found very rarely, so that they have been listed as threatened without any further information being obtained.

Forty-two species considered for assessment which were not data deficient were excluded from the prioritisation process since they could not be secured purely by Tasmanian-based projects. In the case of the 31 species on List 3 (Appendix), this was either because they are highly mobile species, with no discrete population depending (eg breeding) on Tasmania, or because they live on Macquarie Island which is very unlikely to receive funding by the agencies for which this project was prepared. The additional 11 species on List 4 (Appendix) were excluded because no project could be identified that would bring the species to 95% likelihood of security within 50 years, for a variety of other reasons detailed in the list. These reasons related to the constraints of the project needing to be Tasmania-based and within a 50 year timeframe, and included factors that could not be controlled, such as increased risks from wildfire or drought due to climate change. For example, orange-bellied and swift parrots spend part of their year on mainland Australia where significant threats also exist. No project appropriate for funding in Tasmanian alone could be identified that would reliably mitigate these threats. The extremely low numbers and confined distribution of some species also contributed to the conclusion that no project could secure them within the required period. In some cases, lack of information was also cited as an issue, although those species for which this was the key issue were placed in List 2.

The role of captive breeding and translocation was reviewed with regard to the List 4 species. Near the end of the exercise, it was agreed that these actions, if appropriate, would be incorporated into a project if there was no alternative way to attain 95% security for the species. For some List 4 species, however, translocation and captive breeding were not considered while their project was being designed. A review may identify that in some cases these actions are appropriate.

The species on List 4 were discussed in some detail before it was concluded that they could not be secured through Tasmania-based projects. In some cases, a project was developed, but none met the target.

The 60 species already deemed to be secure over the short-term are presented in List 5 (Appendix). No projects were designed for these species, since they would be of zero Benefit for short-term security. Experts identified some of these species as requiring a review of their conservation status. However, others were viewed to be secure specifically because of the special protection afforded them by their threatened status, or were viewed to be at risk over the longer term.

Discussion

Species' positions on List 1 were determined by a wide range of factors, and there were few patterns. However, many high-ranking species are at risk from a single threat, such as habitat modification, and occupy small areas which are easiest to protect. They tend to be less well-known, which may be why these easy-to-secure species have not already been recovered. Some of the fauna lowest on the list are wide-ranging and thereby encounter several different threats.

The estimated cost of securing all 171 threatened species on List 1 was approximately $155 million over a 50 year period (notwithstanding some excluded and shared costs and cost-sharing calculations [Methods: PPP Steps 4 & 8] and inaccuracies of estimates [Results]). Where sufficient funds are not available to carry out all projects simultaneously, extinction risk can only be minimised and not eliminated. However, many species are surprisingly inexpensive to secure: the top 28 can be secured for less than $1 million over a 50 year period, with only $180,000 required in the first 5 years. The cost of securing the top-ranking 165 species on List 1 (96%) over a 50 year period is less than half the cost of securing the remaining 6 lowest ranking species. To minimise extinction risk, it is most cost-efficient to secure species in their priority order because of both their lower mean Cost and their higher mean Success, while their mean project Benefit is similar.

The majority of projects are located in a single NRM region. The high number of projects exclusive to NRM South reflects the high levels of endemicity in the region, especially in the central east coast (dolerite and granite endemic flora) (Reid et al. 1999). The shared projects will require the partner organisations to collaborate closely in order to ensure that the whole project is achieved.

It is important to recognise that this exercise does not indicate that the lower-ranking species should never receive funding. The list only indicates an order for funding. Furthermore, the security of these species may rank highly for a separate objective.

The list of the commonest actions may initially seem a useful way to direct broad-scale landscape management. However, it is important to examine the way common actions vary across projects. Some actions may be contributing to low-ranking projects which are unlikely to be funded in their present form. Others may be estimated to have a low likelihood of success. Most significantly, each will be directed to a very specific location where the experts identified the population with the best chance of being secured. The same action elsewhere may not contribute to securing the species. As described in the Methods (PPP Step 8), the search for these overlaps (ie cost-sharing) can only effectively be carried out once projects to be funded have been identified.

The 171 project prescriptions provide up-to-date key information for listing statements and recovery plans for species which in many cases lack any of these documents, and also to feed into the development of a system to monitor threatened species. The 2009 *Auditor-General's Special Report on the Management of threatened species* (Tasmanian Audit Office 2009) made the specific recommendation that more listing statements and recovery plans are prepared, and that a threatened species monitoring system is implemented (Recommendations 3, 4 and 14). The exercise has thus made significant steps in addressing these recommendations, in four months of work, at the cost of less than two standard recovery plans.

The bringing together of experts on each species provided many other advantages, including improved consensus on recovery actions for species which lacked recovery teams. Additionally, species requiring review of their threatened species status were identified.

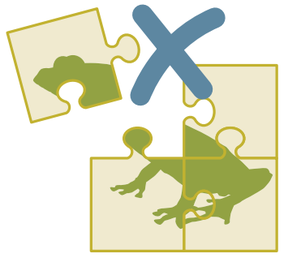
Forty-five of Tasmania's Critically Endangered, Endangered and Vulnerable species cannot be effectively secured as they are considered to be data deficient (List 2). DOC has similarly identified a suite of data-deficient species as worthy of prioritisation under a separate objective – to acquire enough information on each species to enable the design of a project to secure it.

Thirty-one species were excluded because they could not be secured through solely Tasmania-based projects (List 3). An additional two species on List 4 (the swift and orange-bellied parrots) were excluded for the same reason. These thirty-three species can only be secured if efforts are managed at a national, or in some cases, international level.

Other species on List 4 appeared to be suffering threats to which experts could not design a solution. In some cases it may be appropriate to include these species for consideration under the 'data deficient' objective described above.

Potential **misuses** of the priority list

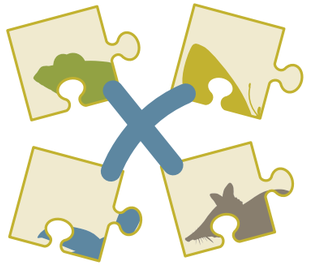
While the list represents an invaluable decision-making tool for prioritising threatened species recovery action funding when used correctly, there are a number of ways in which it can be misused. Most have been indicated in various sections of the rest of the report, but in order to ensure the proper use of the priority list, they are more fully explained in this section. Potential misuses include:



Selection of single actions within high-ranking projects as high priority for funding

The list prioritises whole projects on the basis of their cost-efficiency in meeting the target of securing a threatened species. The actions suggested for each species security project are the minimum set of actions required to secure the species. None of the actions is obsolete, therefore if any of the actions are not funded the species is unlikely to be secured. It is not cost-efficient to invest in parts of projects which may not fully be realised: an isolated action that reduces the threat to a low-ranking species may not be sufficient to prevent its extinction. To minimise extinctions, the cost of this investment should be directed to an action which is part of a project that is being entirely funded.

The list therefore does not provide guidance on the relative importance of individual actions within projects. Furthermore, in the experience of DOC, experts found it difficult to estimate relative importance of actions.



Grouping of common actions as priorities for multi-species recovery actions

As explained above, separation of actions from their projects, disregarding whether those projects will be fully funded or not, will not minimise species extinctions under a limited budget.

There are additional reasons why it is less cost-efficient to fund grouped actions without considering whether the projects to which they relate are being funded. The contribution of the action to securing a species, and its likelihood of success, may be very variable between projects. Furthermore, close examination of the grouped actions is likely to reveal important differences in the way they are to be realised for each project. It may be that unless the action is carried out for an adequate duration, or in the appropriate location, it will do nothing to secure the species.

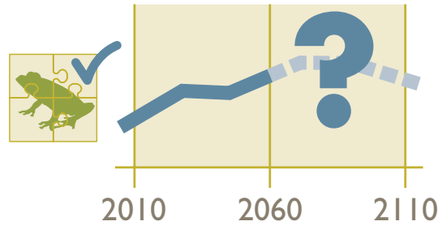
As described in the Methods (PPP Step 8), the search for true overlaps in actions (ie cost-sharing) can only effectively be carried out once projects to be funded have been identified.

Treatment of projects ranking low or absent from List 1 as low priority for all conservation objectives

The list only prioritises projects on the basis of minimising threatened species extinctions over the short term. This objective represents only one area for biodiversity conservation investment, and investment solely in the priorities for this area may compromise other areas. Cost-sharing among projects within and between lists addressing different objectives may allow more projects to be funded.

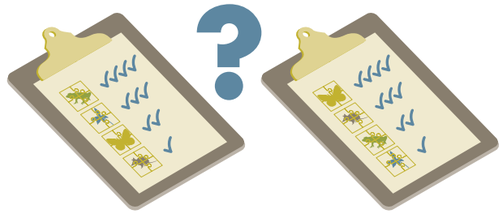
Significantly, the objective which formed the basis of the prioritisation exercise is still imperfectly worded and is not Tasmanian State Government policy, but essentially expresses the aim of minimising Tasmanian species extinctions in response to the requirement of the *Threatened Species Protection Act 1995* for a strategy to ensure the survival of threatened species.

DOC has identified other biodiversity conservation objectives relating to short and long term security, conservation of ecosystem types and functions, and community values. Tasmania is also currently addressing these objectives, even if a PPP-type prioritisation process has not been undertaken for each of them. Thus some of the species projects ranking low for the objective of minimising extinctions rank much more highly in terms of community values or keystone role in maintaining ecosystems.



Assumption that a fully funded project will fully recover a species

The recovery actions identified by this exercise only secure threatened species for 50 years, and still allow the loss of populations and of genetic diversity. They represent a bare minimum for short-term security of each species. If actions to secure species over a longer term period are not funded now, it may subsequently become difficult or impossible to secure the species over the long term.



Assumption that the priority list is exactly correct

The priority order for projects is likely to change over time for several reasons. The project efficiency values (= Benefit x Success/Cost) driving the ranking are generally very close between species (Figure 1d). Decisions regarding threatened species conservation are subject to the many uncertainties relating to imperfect knowledge. New information may change values. The PPP method, while simple and transparent, is still being developed to ensure the most accurate expression of estimates.

The order may also change when currently excluded costs and cost-sharing are incorporated (Methods: PPP Steps 4 & 8), which can only be done when it is known which projects will be funded. Sensitivity analyses can be carried out at this time to identify where more thorough confirmation of estimates would help decide whether a project falls above or below the funding cut-off line.

Nonetheless, List 1 may be treated as the clearest currently available guide to priorities for funding to minimise threatened species extinctions.

Regular review

As indicated in the Methods (PPP Step 9), a review of the prioritisation is appropriate within the next 5 years (as resources permit), in light of progress and new information, incorporating all Tasmanian species.

Formal identification of objective(s)

The objective needs to be more formally agreed in light of the implementation of the 2009 priority list. A longer term objective may be more appropriate, or could be considered in addition to the short term objective.

Work to agree on the objective should include a review of the target taxa. It may be argued that all species should be considered, rather than only those listed as threatened, since some species absent from the list are expected to be suitable for nomination soon. It is also important to decide whether subspecies should be included for review, or only species. Finally, if the Federal government participates in the approach, species which cannot be secured purely through Tasmania-based projects can be included.

Prioritisation of other related objectives

Biodiversity conservation is likely to be most cost-efficient if prioritisation is carried out across all objectives, and costs shared between projects across as well as within these objectives. DOC has identified objectives relating to short and long term security, conservation of ecosystem types and functions, and community values.

Addendum

New information has emerged on some species between the completion of the analyses and the production of the final version of this report.

A new survey has found *Pardalotes quadragintus* (Forty–spotted Pardalote) to be much less secure than previously thought; a new project will be developed for this species over the coming months. Conversely, recent surveys for *Limnodynastes peroni* (Striped Marsh Frog) identified a substantial population on King Island, indicating that this species is more feasible to secure than was previously thought — again, a new project is required. In addition, the high rainfalls of 2009 have led to the emergence of several poorly-known ephemeral flora species in the Midlands, including *Lobelia pratioides* (poison lobelia), Myriophyllum integrifolium (tiny watermilfoil) and *Triptilodiscus pygmaeus* (dwarf sunray), as well as the 'data deficient' species *Amphibromus macrorhinus* (longnose swampgrass) and *Schoenus latelaminatus* (medusa bog sedge). The projects for the first three species will need some modifications, while the latter two species will need to be re-assessed.

As discussed above, it is to be expected that the species order on the priority list is dynamic, and may change as new information emerges. For this reason, it is recommended that those involved in funding decisions regularly check with the Threatened Species Section for updates on any significant priority or project changes.

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Reid, J.B., Hill, R.S., Brown, M.J., and Hovenden, M.J. (1999). *Vegetation of Tasmania*. Flora of Australia Supplementary Series Number 8. Australian Biological Resources Study, Canberra.

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Tasmanian Audit Office (2009). *Management of threatened species.* Report of the Auditor-General: Special Report No. 78.

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Appendix

List 2 – Data deficient species

Experts did not consider that there was sufficient information available on these species to guide the design of a project to secure them. They were therefore excluded from the prioritisation exercise.

TSP Act terms: **e**ndangered; **v**ulnerable; **r**are;

EPBC Act terms: **EX**tinct in the wild (Pedder galaxias); **CR**itically endangered; **EN**dangered; **VU**lnerable; **M**arine **M**igratory.

Species	Common name	TSP Act	EPBC Act	TAS endemic	NRM endemic
Alcedo azurea diemenensis	Azure kingfisher	e			
Amphibromus macrorhinus	longnose swampgrass	e			N
Beddomeia kershawi	Hydrobiid Snail (Macquarie River)	e		end	N
Beddomeia krybetes	Hydrobiid Snail (St. Pauls River)	v		end	N
Beddomeia tumida	Hydrobiid Snail (Great Lake)	e		end	S
Brachionichthys politus	Red Handfish		VU	end	
Caladenia australis	southern spider-orchid	e			N
Caladenia brachyscapa	short spider-orchid	e			N
Caladenia congesta	blacktongue finger-orchid	e			
Caladenia lindleyana	lindleys spider-orchid	e	CR	end	
Caladenia pallida	rosy spider-orchid	e	CR	end	
Caladenia sylvicola	forest fingers	e	CR	end	S
Calochilus campestris	copper beard-orchid	e			N
Castiarina insculpta	Miena Jewel Beetle	e		end	S
Colobanthus curtisiae	grassland cupflower	r	VU		
Corunastylis firthii	firths midge-orchid	e	CR	end	S
Corybas fordhamii	swamp pelican-orchid	e			N
Diporochaeta pedderensis	Lake Pedder Earthworm	e			
Discocharopa vigens	Land Snail	v		end	
Gazameda gunnii	Gunn's screw shell	v			
Gratiola pubescens	hairy brooklime	v			
Haloragis aspera	rough raspwort	v			
Marginaster littoralis	Seastar	e		end	S
Myosurus australis	southern mousetail	e			S
Plantago gaudichaudii	narrow plantain	v			S
Prasophyllum aff. montanum	mountain leek-orchid	e			
Prasophyllum perangustum	knocklofty leek-orchid	e	CR	end	S
Prasophyllum robustum	robust leek-orchid	e	CR	end	CC
Prasophyllum taphanyx	graveside leek-orchid	e	CR	end	N
Pterodroma mollis	Soft-plumaged Petrel	e	VU		
Pterostylis tunstallii	tunstalls greenhood	e			N
Pultenaea sericea	chaffy bushpea	v			N
Rhytidosporum inconspicuum	alpine appleberry	e			
Schayera baiulus	Schayer's Grasshopper	e		end	
Schoenus latelaminatus	medusa bog sedge	e			N
Solanum opacum	greenberry nightshade	e			
Stenopetalum lineare	narrow threadpetal	e			
Sterna striata	White-fronted Tern	v			
Sympterichthys sp. (CSIRO #T1996.01)	Waterfall Bay Handfish		VU	end	
Sympterichthys sp. (CSIRO #T6.01)	Ziebell's Handfish		VU	end	
Taskiria mccubbini	McCubbins Caddis Fly	e		end	S
Taskiropsyche lacustris	Lake Pedder Caddis Fly	e		end	S
Thelymitra bracteata	leafy sun-orchid	e			S
Triglochin mucronatum	prickly arrowgrass	e			N
Xerochrysum palustre	swamp everlasting		VU		

List 3 – Excluded Critically Endangered, Endangered & Vulnerable species (outside Tasmanian remit)

These species were excluded either because they are highly mobile with no purely Tasmania-based population, or because they live in an area in which Tasmania-based organisations were very unlikely to invest. None of these species are endemic either to Tasmania or an NRM region. See List 4 for additional excluded species. Abbreviations as for List 2.

Species	Common name	TSP Act	EPBC Act	Reason for exclusion
Halobaena caerulea	Blue Petrel	v	VU	Macquarie Island species
Leucocarbo atriceps purpurescens	Macquarie Island Shag	v	VU	Macquarie Island species
Macronectes giganteus	Southern Giant Petrel	v	EN	Macquarie Island species
Macronectes halli	Northern Giant Petrel	r	VU	Macquarie Island species
Mirounga leonina	Southern Elephant Seal	e	VU	Macquarie Island species
Procellaria cinerea	Grey Petrel	e		Macquarie Island species
Pterodroma lessonii	White-headed Petrel	v		Macquarie Island species
Arctocephalus tropicalis	Subantarctic Fur Seal	e	VU	Migratory species
Balaenoptera musculus	Blue Whale	e	EN	Migratory species
Balaenoptera physalus	Fin Whale	v	VU	Migratory species
Carcharodon carcharias	Great White Shark	v	VU	Migratory species
Caretta caretta	Loggerhead Turtle	e	EN	Migratory species
Chelonia mydas	Green Turtle	v	VU	Migratory species
Dermochelys coriacea	Leathery Turtle	v	VU	Migratory species
Diomedea amsterdamensis	Amsterdam Albatross		EN	Migratory species
Diomedea antipodensis	Antipodean Albatross		VU	Migratory species
Diomedea dabbena	Tristan Albatross		EN	Migratory species
Diomedea epomophora	Southern Royal Albatross		VU	Migratory species
Diomedea exulans	Wandering Albatross	e	VU	Migratory species
Diomedea gibsoni	Gibson's Albatross		EN	Migratory species
Diomedea sandfordii	Northern Royal Albatross		EN	Migratory species
Eretmochelys imbricata	Hawksbill Turtle	v	VU	Migratory species
Eubalaena australis	Southern Right Whale	e	EN	Migratory species
Megaptera novaeangliae	Humpback Whale	e	VU	Migratory species
Numenius madagascariensis	Eastern Curlew	e		Migratory species
Phoebetria fusca	Sooty Albatross	r	VU	Migratory species
Phoebetria palpebrata	Light-mantled Sooty Albatross	v		Migratory species
Podiceps cristatus	Great Crested Grebe	v		Migratory species
Thalassarche chrysostoma	Grey-headed Albatross	e	VU	Migratory species
Thalassarche melanophrys	Black-browed Albatross	e	VU	Migratory species
Thalassarche steadi	White-capped Albatross		VU	Migratory species

List 4 – Excluded Critically Endangered, Endangered & Vulnerable species (other specified reasons)

For these species, which are all fauna, projects were developed but could not achieve security within constraints of Tasmania-based project location or stipulated 50 year timeframe. However, the role of captive breeding and translocation may need to be reviewed for some of these species' projects. See List 3 for other excluded species. Abbreviations as for List 2. *= Tasmanian breeding endemic.

Species	Common name	TSP Act	EPBC Act	TAS endemic	NRM region		Security without project	Project Benefit	Project Success	Project Cost ($)	Reason target security not possible
Acanthiza pusilla archibaldi	Brown Thornbill (King Island)	e	EN	end	CC		0.30	0.30	0.34	139184	Very low numbers, limited information.
Acanthornis magnus greenianus	Scrubtit (King Island)	e	CR	end	CC		0.40	0.30	0.34	152,384	Very low numbers, very confined distribution where at risk from fire, limited information.
Beddomeia camensis	Hydrobiid snail (Cam River)	e		end	CC		0.15	0.65	0.72	20,195	Very confined distribution, nowhere to translocate (due to competition and other threats)
Beddomeia waterhouseae	Hydrobiid snail (Clayton's Rivulet)	e		end	CC		0.30	0.60	0.34	64,915	Very confined distribution, nowhere to translocate (due to competition and other threats)
Chrysolarentia decisaria	Tunbridge Looper Moth	e		end	S		0.20	0.55	0.34	216,664	Appear to be very low numbers.
Dasybela achroa	Saltmarsh Looper Moth	v		end	S		0.40	0.40	0.46	106,292	Confined distribution will likely be further reduced as sea level rise & storm events remove habitat.
Engaeus martigener	Furneaux Burrowing Crayfish	v	EN	end	N		0.25	0.55	0.14	662,196	Confined distribution, very vulnerable to climate change and wildfires. Doubling translocation effort might attain 85% benefit.
Lathamus discolor	Swift Parrot	e	EN	end *	CC, N & S		0.10	0.60	0.27	2,921,984	Can only be secured with additional mainland-based actions.
Limnodynastes peroni	Striped Marsh Frog	e			CC & N		0.50	0.30	0.17	508,284	Chytrid disease effects unknown - may be trivial or highly significant. Climate change also may be heavy impact.
Lissotes latidens	Broad-toothed Stag Beetle	e	EN	end	S		0.50	0.35	0.11	132,320	Very low numbers, confined distribution, habitat at risk from fire. Climate change likely heavy impact.
Neophema chrysogaster	Orange-bellied Parrot	e	CR	end *	CC & S						Very low numbers; can only be secured with additional mainland-based actions.

List 5 – Currently short-term secure species

These species were estimated to be short-term secure already, without requiring additional management. Abbreviations as for List 2.

Species	Common name	TSP Act	EPBC Act	TAS endemic	NRM endemic
Acacia axillaris	midlands wattle	v	VU	end	
Acrotriche cordata	coast groundberry	v			North
Anogramma leptophylla	annual fern	v			
Atriplex suberecta	sprawling saltbush	v			
Barbarea australis	riverbed wintercress	e	CR	end	
Beddomeia briansmithi	Hydrobiid snail (Fern Creek)	v		end	North
Beddomeia fromensis	Hydrobiid snail (Frome River)	e		end	North
Beddomeia lodderae	Hydrobiid snail (Upper Castra Rivulet)	v		end	Cradle Coast
Beddomeia ronaldi	Hydrobiid snail (St. Patricks River)	e		end	North
Bedfordia arborescens	tree blanketleaf	v			North
Blechnum cartilagineum	gristle fern	v			
Caladenia caudata	tailed spider-orchid	v	VU	end	
Caladenia dienema	windswept spider-orchid	e	CR	end	Cradle Coast
Caladenia patersonii	patersons spider-orchid	v			
Carex tasmanica	curly sedge		VU		
Corunastylis brachystachya	shortspike midge-orchid	e	EN	end	Cradle Coast
Cyathea cunninghamii	slender treefern	e			
Desmodium gunnii	slender ticktrefoil	v			
Dianella amoena	grassland flaxlily	r	EN		
Diuris lanceolata	large golden moths	e	EN	end	Cradle Coast
Diuris palustris	swamp doubletail	e			
Epacris acuminata	claspleaf heath	r	VU	end	
Epacris graniticola	granite heath	v	EN	end	North
Epacris virgata (Kettering)	pretty heath	v	EN		
Euphrasia semipicta Type 2	peninsula eyebright	e	EN	end	South
Glycine microphylla	small-leaf glycine	v			
Goedetrechus mendumae	Blind Cave Beetle (Ida Bay)	v		end	South
Goedetrechus parallelus	Slender Cave Beetle (Junee-Florentine)	v		end	South
Hakea ulicina	furze needlebush	v			North

Species	Common name	TSP Act	EPBC Act	TAS endemic	NRM endemic
Hyalosperma demissum	moss sunray	e			
Isopogon ceratophyllus	horny conebush	v			North
Lythrum salicaria	purple loosestrife	v			
Myoporum parvifolium	creeping boobialla	v			North
Pachyptila turtur subantarctica	Fairy Prion (southern sub-species)	e	VU		
Pardalotus quadragintus	Forty-spotted Pardalote	e	EN	end	
Persicaria decipiens	slender waterpepper	v			
Phyllangium divergens	wiry mitrewort	v			
Pimelea axiflora subsp. axiflora	bootlace bush	e			Cradle Coast
Platycercus caledonicus brownii	King Island Green Rosella	v		end	
Plesiothele fentoni	Lake Fenton Trapdoor Spider	e		end	South
Pomaderris elachophylla	small-leaf dogwood	v			
Prasophyllum amoenum	dainty leek-orchid	e	EN	end	South
Prasophyllum favonium	western leek-orchid	e	CR	end	Cradle Coast
Prasophyllum pulchellum	pretty leek-orchid	e	CR	end	
Prasophyllum stellatum	ben lomond leek-orchid	e	CR	end	North
Prostanthera rotundifolia	roundleaf mintbush	v			North
Pseudemoia pagenstecheri	Tussock Skink	v			
Pterostylis atriola	snug greenhood	e	EN	end	
Pterostylis cucullata subsp. cucullata	leafy greenhood	e	VU		
Pterostylis ziegeleri	grassland greenhood	v	VU	end	
Pultenaea prostrata	silky bushpea	v			
Scaevola aemula	fairy fanflower	e			
Scleranthus fasciculatus	spreading knawel	v			
Stenanthemum pimeleoides	propellor plant	v	VU	end	
Sterna vittata bethunei	Antarctic Tern	e	EN	end	
Tasmanipatus anophthalmus	Blind Velvet Worm	e		end	North
Thelymitra antennifera	rabbit ears	e			
Tyto novaehollandiae castanops	Masked Owl	e		end	
Veronica novae-hollandiae	coast speedwell	v		end	
Vombatus ursinus ursinus	Common Wombat (Bass Strait)		VU	end	

Notes